REMARKS

Claims 1-8 and 10-111 are pending in the application, all of which claims stand rejected. Claim 9 has been canceled above. Independent claims 1, 48, 90, and 105 have been amended above to claim additional aspects of Applicant's invention.

REJECTIONS UNDER 35 U.S.C. 112

Claims 9 and 12 were rejected under 35 U.S.C. 112 as failing to comply with the enablement requirement. Applicant has canceled claim 9, rendering its rejection moot. Regarding claim 12, the Office Action states that the passage bridging pages 21 and 22 "does not identify the fields, not [sic] does it set for [sic] how such a structure could be used with the detectors of the disclosure nor how other measuring systems could be incorporated into the system. Additionally, for the disclosed measurement, such a presence of ambient light would interfere with the disclosed measurement at least partially masking the scattered like desired to be measured." Applicant respectfully disagrees.

As an initial matter, it is respectfully noted that there is no requirement under 35 U.S.C. 112 that the fields to which a particular claimed structure pertains be set forth explicitly in the disclosure, especially when one skilled in the art would, as is the case here, understand when it is desirable to use a particular claimed structure. In the instant case, claim 12 recites that the reflector comprises a "half-silvered reflector." There is no recitation in the text bridging pages 21 and 22 or in the body of the claim that indicates that the use of a half-silvered reflector requires that "other measuring systems" be incorporated into the system. Neither is there an inherent need for other measuring systems. Therefore, Applicant respectfully submits that the Examiner's observation that the disclosure fails to indicate "how other measuring systems could be incorporated into the system" is irrelevant to the subject matter recited in claim 12.

Furthermore, Applicant respectfully disagrees with the Examiner's characterization that the presence of ambient light would "interfere with" measurements by "at least partially masking the scattered light desired to be measured." One skilled in the art of measuring scatter, and particularly one involved in color measurement, understands that it is sometimes desirable to simultaneously measure "ambient illumination in addition to illumination from

the source 20", as clearly explained in the specification. (Specification, page 21, lines 22-23.) Thus, it is incorrect to characterize the presence of ambient light as "interfering with" the disclosed measurement, when the goal of providing a half-silvered reflector is to permit ambient light to strike the sample so that the ambient light is also measured. Applicant respectfully submits that the passage bridging pages 21 and 22, when read in the context of the preceding system description, more than adequately teaches one skilled in the art how to simultaneously measure ambient illumination and source illumination. The detectors of the disclosure are more than adequate to simultaneously measure ambient and source illumination. Thus, claim 12 is enabled.

Hence, for the above reasons, Applicant respectfully requests that the rejection of claim 12 be withdrawn.

REJECTIONS UNDER 35 U.S.C. 103(a)

Claims 1-5, 8-10, 12, 14-15, 18, 30-32, 35, 37, 39, 42, 44, 48-51, 54, 58-59, 62, 74-75, 78, 80, 82, and 84-86 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Toba et al. (US 5,371,582).

As to claim 1, the Office Action states that "Toba shows, in figure 3 in particular, an apparatus comprising a source (light emitting element 2) producing a radiation beam, and a paraboloidal reflector... with an optical axis parallel to the path of the beam...". Applicant has amended independent claims 1 and 48 to recite that the reflector has an "optical axis disposed substantially parallel to the tangent of the sample surface at a selected sample location to be measured...". That is, for example, if the sample is a generally planar object, the tangent of the sample surface would lie parallel to the plane of the sample, so the optical axis of the reflector would be disposed substantially parallel to the plane of the sample surface. Support for the amendment can be found in the application at least at Fig. 1, for example. In addition, claims 1 and 48 have been amended to recite the feature of "a controller ... for calculating the distribution of radiation received by the detector as a function of angle of emission from the sample and as a function of the angle of incidence of the illumination of the sample to compute a BRDF of the sample." Support the for amendment can be found at least at page 19, line 5-8, page 1, line 10 through page 2, line 9, and the Summary of the Invention.

In contrast to Applicant's claimed invention as recited in claims 1 and 48, Toba specifically discloses that the optical axis of the reflector is disposed perpendicular to the surface of the workpiece 1. (See Toba, Fig. 3, for example.) Such a configuration of the optical axis in Toba is entirely consistent with its disparate purpose as a "thickness/depth measuring apparatus... capable of measuring the thickness of a resist film... and the depth of a groove...". (Column 1, lines 63-66.) In order to make both measurements of resist film thickness and groove depth, Toba discloses that two separate measurements must be made at two precise angles of illumination. Namely, for p-polarized light, the angle of illumination is the Brewster angle, because "substantially no light is reflected by the processed portion of the workpiece 1, and hence the interference period of the reflected, diffracted light 11 depends only on the thickness Tr of the resist film." (Column 3, lines 24-31.) In addition, for s-polarized light, the angle of incidence is adjusted so that the detected intensity of the (forwardly) diffracted light reaches a maximum or minimum from which the depth of the groove can ultimately be determined. (Column 3, lines 37-47.)

Nowhere does Toba suggest or teach the desirability of altering the orientation of the optical axis of the reflector to be anything other than normal to the sample surface. Hence, there is no teaching or suggestion in Toba to modify the device to provide Applicant's claimed feature of a reflector having an "optical axis disposed substantially parallel to the tangent of the sample surface at a selected sample location to be measured..." as recited in claims 1 and 48. Indeed, placement of the detector in Toba on the opposite side of the optical axis from the source permits the detector to collect radiation emitted in the forward direction, such as the reflected radiation from illumination with the p-polarized beam and forwardly diffracted radiation from illumination with the s-polarized beam, which correspond to the precise angles of illumination and reflection/diffraction required by Toba to calculate the film thickness and groove depth by the formulas provided therein. In addition, since Toba is only concerned with measuring thicknesses (film thickness and groove depth), there is no suggestion or teaching within Toba to provide "a controller ... for calculating the distribution of radiation received by the detector as a function of angle of emission from the sample and as a function of the angle of incidence of the illumination of the sample to compute a BRDF of the sample" as recited in Applicant's claims 1 and 48. Indeed, as explained above Toba is

only concerned with measuring light emitted at two specific angles of emission corresponding to specific angles of illumination. Toba is completely unconcerned with providing a controller to compute a BRDF, that is the distribution of radiation emitted from the sample as a function of angle of incidence of illumination. Hence, for all of these reasons, Toba fails to suggest or teach the desirability of the quoted claim features, and, thus, one skilled in the art having the benefit of only Toba's disclosure would not be motivated to modify the device of Toba to arrive at Applicant's claimed invention as recited in independent claims 1 and 48. Accordingly, Applicant respectfully requests that the Examiner withdraw the rejections of independent claims 1 and 48, as well as dependent claims 2-5, 8, 10, 12, 14-15, 18, 30-32, 35, 37, 39, 42, 44, 49-51, 54, 58-59, 62, 74-75, 78, 80, 82, and 84-86, which depend respectively therefrom.

Claims 1-111 stand rejected under 35 U.S.C. 103(a) as being unpatentable over "McNeil et al (US 5,703,692) in view of Pearson et al (US 5,541,413) and Toba et al (US 5,371,582), and Tsuji et al (US 5,270,794)."

The Office Action states that "McNeil et al shows a device and method with a light source (105), means to vary the location of the light source on a focusing means (110) in order to vary the angle of incidence on a sample..., and shows means for receiving, and detecting, the distribution of light 'emitted' from the sample, which can be a detector array...". The Office Action further states that "McNeil does not show the use of a paraboloid mirror to direct and focus the light from the light emitting means to and from the sample... and in particular it is known in the art that in a similar system a paraboloid mirror can be used in a manner identical to the use of the ***mirror*** of McNeil et al; this is shown by Toba et al, figured 3 in particular." (Emphasis Added.) As an initial matter, Applicant respectfully submits that the use of the term "mirror" as bolded in the previous quote may be a typographical error. Applicant believes that the Examiner meant to say "lens" instead of "mirror", and Applicant will answer the rejections with this understanding. It is, however, respectfully requested that the Examiner confirm Applicant's interpretation of this "typographical error."

Applicant agrees with the Examiner that "McNeil does not show the use of a paraboloid mirror to direct and focus the light from the light emitting means to and from the sample..." However, Applicant respectfully points out, that even if it were obvious to substitute the mirror from Toba for the lens of McNeil (which point Applicant does not concede), the proposed combination of Toba with McNeil would fail to disclose each and every element recited in independent claims 1, 48, 90, and 105. (Independent claim 108 is addressed separately below.) Specifically, Applicant respectfully submits that the proposed combination of Toba with McNeil at least fails to disclose or suggest Applicant's claimed feature that the reflector has an "optical axis disposed substantially parallel to the tangent of the sample surface at a selected sample location to be measured..." as variously recited in independent claims 1, 48, 90, and 105. The absence of this feature within Toba has already been noted above. As to McNeil, McNeil shows that the refractive element, lens 110, has an optical axis as perpendicular to the sample surface. Indeed, using the elements disclosed in McNeil, it would be virtually impossible as a practical matter to arrange the lens so that the optical axis is disposed "substantially parallel to the plane of the sample surface." Moreover, since there is no teaching or suggestion within Toba or McNeil to change the orientation of the optical axis of the mirror (Toba) or lens (McNeil), one skilled in the art, having only the benefit of Toba and McNeil, would not be motivated to modify the device of McNeil to arrive at Applicant's claimed invention as recited in independent claims 1, 48, 90, and 105.

Regarding Pearson, the office action states that "[t]hose in the art would have found it obvious to use reflective optics, as shown by... Pearson et al, for the refractive optics of McNeil et al..." However, Applicant respectfully points out that no motivation is found in either McNeil or Pearson to modify the McNeil device to include the mirror(s) of Pearson. Such modifications to the structure of the McNeil device are not suggested by, or consistent with, the objectives and disclosure of McNeil. For example, in order to replace the lens 110 of McNeil with the mirror 36 of Pearson additional mirrors 38 and/or 40 of Pearson would be required to redirect the emitted radiation to the detector of McNeil. However, the presence of such extra mirrors 38 and 40 would limit the field of view of the detector and thus would limit the range of angles that may be measured by the detector. Such a limitation is not a concern to Pearson, because Pearson is merely concerned with thickness measurements, and

as such needs only to measure a "beam of light along a predetermined path extending to and from the surface" of the sample. (Column 3, lines 34-35.) (Indeed, the relative location of the source to the detector in Pearson is fixed, so that the illumination and detection angles cannot be varied independently.) It is generally undesirable to limit the range of detected light in a scatterometer. In this regard, not only is there no reason to modify McNeil to substitute a mirror for the lens, a proposed modification of McNeil in view of Pearson would render McNeil **less suited for its intended purpose** of providing a scatterometer and therefore would be an **inferior structure** to the structure actually disclosed by McNeil. Thus, Applicant specifically disagrees with the Examiner's statement that "[T]hose in the art... would recognize that the particular means for directing the light beam to the focusing means is not critical, and that other known arrangements for such control of the position of the light beam on the focusing means would have been obvious." Hence, there can be no motivation for the proposed combination of McNeil with Pearson.

Still further, even if there were motivation to combine McNeil with Pearson, Applicant respectfully submits that the proposed combination fails to disclose at least the claimed feature of "a controller for varying the relative orientation of the source to the mirror to vary the angle of incidence of illumination, and for calculating the distribution of radiation received by the detector as a function of angle of emission from the sample and as a function of the angle of incidence of the illumination of the sample to compute a BRDF of the sample" as recited in independent claims 1 and 48.

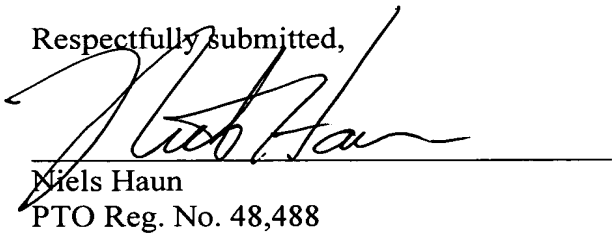
Consequently, for all of the above reasons, the proposed combination of Toba and/or Pearson with McNeil fail to support a finding of obviousness for independent claims 1, 48, 90, and 105. Accordingly, Applicant respectfully requests that the Examiner withdraw the rejections of independent claims 1, 48, 90, and 105, as well as claims 2-8, 10- 47, 49-89, 91-104, 106, and 107, which depend respectively therefrom.

In addition, Applicant respectfully submits that the prior art references relied upon by the Examiner fail to disclose, either singly or in combination, each and every element recited in claims 108-111. Furthermore, the Office Action fails to address where the feature of a "rotatable aperture disk" as recited in independent 108 is disclosed or suggested in the cited

prior art. Likewise, the prior art references fail to disclose or suggest, and the Office Action fails to address, the feature that the aperture disk comprises "multiple apertures" (claim 109), that the beam steerer comprises "a slit-aperture disk" (claim 110), and that the apertures "are disposed in a spiral pattern" (claim 111). Since the prior art references relied upon by the Examiner fail to disclose each and every feature recited in claims 108-111, such claims do not stand properly rejected. (Furthermore, Applicant respectfully notes that dependent claim 56 also recites the feature of a "rotatable aperture disk".) Therefore, Applicant respectfully requests that the Examiner withdraw the rejections of claims 56 and 108-111.

In view of the foregoing amendments and remarks, it is believed that the claims in this application are now in condition for allowance. Early and favorable reconsideration is respectfully requested. The Examiner is invited to telephone the undersigned in the event that a telephone interview will advance prosecution of this application.

Respectfully submitted,



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